regions may be partly due to the intense discharge of negatively electrified particles into the atmosphere from the highly electrified mountain mass, while of course the rapid currents of rising and falling air are thermodynamic effects.

Other properties of the radiations from radiant matter are fully given by Prof. J. J. Thomson in his article in the Encyclopedia Britannica on the electric discharge through gases.

Gases become conductors of electricity when they are exposed to the Roentgen rays or to the radiation from uranium, thorium, polonium, radium, or actinium, or by the passage through them of cathode rays or Lenard rays, or by exposure to the radiation emitted by electric sparks. * * * A gas exposed to Roentgen rays retains its conductivity for some little time. If, however, it is filtered through a plug of tightly packed glass, wool, or through water, or through metal tubes, or if an electric current be made to traverse it, its conducting power is removed. * * * We regard the conductivity of the gas as due to the presence of positively and negatively electrified particles called ions. * * * An ion after being formed does not last forever, but has a certain duration of life. * * *

The life of an ion in a gas at low pressure is longer than at high pressure, but the velocity of the ion is greater at low pressure. The velocity of the negative ion is almost always larger than that of the positive ion; but if moisture be present in the gas it tends to collect around the ion; it condenses more easily on the negative than on the positive ion, and produces a relatively larger diminution in the velocity of the negative than the positive. When Roentgen rays are passed through moist but dustless air while the air is being expanded, a small expansion and cooling will produce cloudy condensation, but a much larger expansion and cooling will be needed in order to produce cloudy condensation without the assistance of the ions produced by the Roentgen rays. The latter seem, therefore, to act as nuclei favoring the condensation of the vapor.

The sun as the source of our light and heat sends us an intense and complex radiation which doubtless includes the Roentgen and other forms of rays. Sunlight as we get it at the earth's surface is possibly not so rich in these rays as it is at the upper limit of the atmosphere and it does not produce electric conductivity in gases so perfectly as does the radiation from the electric arc light. Elaborate series of observations have rendered it probable that ultraviolet light does not ionize the gas through which it passes until after it has struck the absorbing surfaces between which the electric discharge is taking place, whereas in the case of the cathode and the Lenard rays the gas is ionized at once by the passage through it of the negatively electrified particles moving with great velocity.

It is a plausible hypothesis that sunlight after striking the negatively electrified surface of the earth is reflected and changed in some such manner that the radiation outward from the earth's surface has the power to ionize some of the constituents of the atmosphere and stimulate the condensation of vapor into fog and cloud. Meteorologists therefore must look forward with much interest to further investigations in this field of research.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. Ford A. Carpenter, Observer, reports that on December 10, he delivered a lecture on Weather Studies without Instruments before the senior class of the San Diego State Normal School; special reference was made to the clouds and their relation to weather changes.

H. H. MOORE.

Harry H. Moore, voluntary observer for a number of years past, was born in New Haven, Conn., January 15, 1872. At an early age he evinced a mental activity far in excess of his physical strength—a condition remaining with him through life.

Unable to enter into any active business pursuit, he turned to books, music, and nature for recreation, being an extensive reader, a fine pianist and a genuine lover of natural scenery; his love of nature led him into the habit of observing the varying phases of the weather.

The most marked characteristics of his nature were truth and accuracy, subordinating everything, often personal inconvenience, to attain these; this is shown by the careful manner in which his weather reports were prepared, and the punctilious care which characterized all his dealings.

To the casual observer he was quiet and reserved; to those who knew him intimately, a young man of the highest ideals, an exponent of the worthiest sentiments found in humanity, a trusted and loyal friend, whose death occurring in Hartford, Conn., December 8, 1902, leaves no stain, no blemish—only a pure, sweet memory.—*K. G. T.*

CORRIGENDA.

MONTHLY WEATHER REVIEW for July, 1902, page 357, column 1, lines 21 and 22 from bottom, for "several ascensions" read "first ascension;" line 19 from bottom, for "same" read "next."

MONTHLY WEATHER REVIEW for November, 1902, page 525, column 1, line 25, for "1852" read "1872."

THE WEATHER OF THE MONTH.

By W. B. STOCKMAN, Forecast Official, in charge of Division of Records and Meteorological Data.

CHARACTERISTICS OF THE WEATHER FOR DECEMBER.

The mean temperature for the month was generally below the normal, and in appreciable values in the different geographical districts, except in the South Atlantic States, Florida Peninsula, the middle Plateau, and middle and south Pacific districts, where the mean daily departures were slightly in excess.

In the west Gulf States, upper Lake region, North Dakota, middle and southern slope, southern and middle Plateau, and middle and southern Pacific districts there was a slight deficiency in precipitation, the greatest departures —1.5 inches and —1.0 inch, occurring, respectively, in the two last-named districts. In the remaining geographical districts the precipitation was above the normal, but the departures were slight, except in New England, the Middle Atlantic States, Ohio Valley and Tennessee, Missouri Valley, and the north Pacific districts, where they ranged from + 1.1 inches to + 2.3 inches.

The relative humidity was normal in the east Gulf States, North Dakota, and the north Pacific districts; slightly below in the South Atlantic States, Florida Peninsula, and the middle and south Pacific districts; elsewhere it was above normal, and markedly so in the northern slope and middle slope regions, where it amounted to + 13 per cent and + 10 per cent, respectively.

The cloudiness was below the average in the Florida Peninsula, North Dakota, and the middle Plateau region; normal in the south Pacific district, and above normal in the remaining geographical districts.

PRESSURE.

The distribution of monthly mean pressure is shown graphically on Chart VI and the numerical values are given in Tables I and VI.

The area of highest mean barometric pressure overlay the Middle Atlantic and Southern States, central valleys, and cen-

tral Rocky Mountain regions. The lowest mean pressure was reported from the extreme northwestern part of the north Pacific coast district. The pressure was above the normal in New England and in those portions of the Middle States contiguous thereto, upper Lake region, upper Mississippi Valley, Missouri Valley, the middle and northern slope, and the eastern part of the southern and middle Plateau regions generally, and in the lower Ohio Valley and western Tennessee; elsewhere it was generally below the normal, but in no district was the departure especially marked.

In New England the mean pressure for the month diminished slightly from that of November, 1902, and increased in all other districts, and from about longitude 90° westward to the Pacific coast districts with a marked variation, the maximum increase, about .20 inch, occurring over North Dakota.

TEMPERATURE OF THE AIR.

In the eastern part of the South Atlantic States and Florida, New Mexico, northwestern Colorado, southern and western Wyoming, southern Idaho, Nevada, central and southern Oregon, and California, except the central coast and central-northern valley districts, reports from regular Weather Bureau stations show the mean temperature to have been above the normal. In the remaining districts the mean temperature was below the normal, and generally to a marked degree; the mean daily departures from the southern parts of Missouri and Kansas northwestward over North Dakota and Montana ranged from —4° to —11°. In central and western New England and the north-central portions of the Middle Atlantic States the departures ranged from —4.0° to —5.8°.

Reports from climate and crop centers, in which are included reports from voluntary and cooperating stations with the regular stations in compiling the data, show a much less extensive area in which mean temperatures above normal obtained.

The location of the region of greatest negative departure from the normal, as deduced from reports from climate and crop centers, is about the same as from regular stations only, but the departures were, as a rule, somewhat smaller in value, especially over portions of the middle-western and northwestern area.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	26.5	—3.5	+ 4.5	+0.4
Middle Atlantic	12	34.2	—2.0	+ 1.9	+0.2
South Atlantic	10	49.0	+0.2	+ 1.0	+0.1
Florida Peninsula*	8	62.4	+1.3	+ 4.6	+0.4
East Gulf	9	49.5	—1.7	+ 4.5	+0.4
West Gulf	7	49.6	—1.8	+10.0	+0.8
Ohio Valley and Tennessee	11	35.7	—2.5	+ 0.7	+0.1
Lower Lake	8	27.5	—3.0	+ 3.6	+0.3
Upper Lake	10	23.4	—1.1	+18.1	+1.5
North Dakota*	8	7.4	—5.4	+12.4	+1.0
Upper Mississippi Valley	11	25.0	—3.4	+ 7.3	+0.6
Missouri Valley	11	22.1	—6.5	+ 5.2	+0.4
Northern Slope	7	20.6	—3.9	+ 9.7	+0.8
Middle Slope	6	30.8	—4.0	+ 9.0	+0.8
Southern Slope*	6	40.2	—1.6	+12.6	+1.0
Southern Plateau*	13	38.7	—0.4	— 1.5	—0.1
Middle Plateau*	9	28.0	+1.0	+ 1.9	+0.2
Northern Plateau*	12	30.0	—0.3	+ 5.1	+0.4
North Pacific	7	41.8	—0.3	+ 3.8	+0.3
Middle Pacific	5	48.7	+0.2	— 0.2	0.0
South Pacific	4	52.8	+0.1	— 5.7	—0.5

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

The temperature was below the average in all portions of the Dominion. The most marked negative departures occurred in the Northwest Territories and over the eastern and northern parts of British Columbia, and varied from 6° to 10°, and the next largest departures were over the greater portion of Ontario and in western Quebec and the western part of New Brunswick, and ranged from 3° to 5°.

The location of the isotherms of mean temperature lie somewhat to the southward of their positions in December, 1901, except along the coasts of the South Atlantic and Gulf States, and over Florida. Over the extreme southern portion of Florida mean temperatures of 70° were reported, of which there were none in December, 1901. Over the extreme northwestern portion of Minnesota and northern North Dakota mean temperatures of 5° or less were reported, which is about 5° lower than the mean temperatures reported from that region in December, 1901.

As a rule the isotherms of maximum and minimum temperatures were located to the southward of their position in December, 1901. Freezing temperatures extended well into the southern part of the central section of Florida, and in central Texas to well below the thirtieth parallel. Light frosts occurred in California during the first week, and heavy frosts in all sections during the second and third weeks, and in some districts during the fourth week.

PRECIPITATION.

The departures from the normal, as deduced from the data compiled at climate and crop centers, show the precipitation to have been in excess everywhere, except in south-central Texas and California. The region of greatest excess extended from Arkansas and Mississippi northeastward, the maximum positive departures being reported from Kentucky, 3.80 inches, and New Jersey, 3.84 inches. This distribution of precipitation differs somewhat from that charted from data collected at the regular stations, which show several areas over which the precipitation was deficient. This variance is, undoubtedly, due to the shorter period of time for which means have been computed from the voluntary and cooperating stations and to the greater number of stations distributed over the several districts.

The region of greatest monthly precipitation was located on the north Pacific coast, with a second area in southeastern Arkansas, western Tennessee, and southern and central Kentucky. In the latter region the amounts were not so great as in the former.

Idaho reports the amount of precipitation during the month as the greatest during any December of record. The precipitation was heaviest over the northeastern and central districts, and the larger amounts reported from those districts materially affected the average for the State, as over the other portions the precipitation generally was slightly below the normal.

The snowfall over eastern Ohio, eastern West Virginia, Pennsylvania, New York, and New England was very heavy, as it also was in portions of the following States: Michigan, Wisconsin, Iowa, and Minnesota, and the Rocky Mountain regions generally. The consensus of opinion is that an ample amount of snow has already fallen in the Rocky Mountain districts to furnish a sufficient supply of water for irrigation and other purposes during the coming season.

Colorado reports 41 stations with 10 inches or more, and Ruby, 79 inches of snowfall during the month; several stations in northeastern upper Michigan report 40 or more inches; 6 to 16 inches fell in northwestern Arkansas on the 4th.

The southern limit of snow on the ground at the end of the month was at about latitude 40° on the Atlantic coast, trending slightly to the southward in passing westward to about latitude 36° in New Mexico, then bending somewhat to the northward until northeastern California was reached; thence the western limit was about longitude 120° until northern

Oregon was reached, when it advanced to about longitude 122°, and passed northward over Washington.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 18. Arkansas, 12, 14. California, 4, 9, 10, 11, 12, 22, 26. Connecticut, 5, 13, 21, 25. Delaware, 15. District of Columbia, 4, 29. Florida, 4. Georgia, 4. Idaho, 1. Illinois, 14, 15, 20. Indiana, 5, 13, 21. Indian Territory, 14. Kentucky, 8. Louisiana, 4. Maryland, 4, 5, 13, 15, 16, 28, 29. Massachusetts, 3, 5, 16, 21, 30. Michigan, 11. Missouri, 20. Nevada, 10, 11. New York, 3, 13, 14, 15, 21. North Carolina, 15, 29. North Dakota, 21. Ohio, 12, 21. Oklahoma, 14. Oregon, 1, 4, 5, 10, 11, 12, 21, 22, 26, 27. Pennsylvania, 2, 11, 12, 13, 15, 16, 21. Rhode Island, 13, 21. Utah, 2, 5, 12, 15, 27. Vermont, 21, 23. Virginia, 4, 13, 15, 26, 29. Washington, 1, 2, 4, 5, 22, 23, 26, 31. West Virginia, 1, 15, 29. Wisconsin, 15.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 28, 29. Arizona, 14, 19, 31. Arkansas, 3, 4, 14, 28, 29. California, 10, 11, 26. Colorado, 2, 8, 13, 19. Connecticut, 5, 13, 21, 25, 29, 30. Delaware, 5, 12, 13. District of Columbia, 29. Georgia, 15, 28, 29. Idaho, 8, 9, 25, 26. Illinois, 2, 3, 4, 10, 11, 12, 13, 14, 15, 18, 19, 21, 23, 24, 28, 29. Indiana, 2, 5, 6, 11, 12, 13, 14, 15, 16, 24. Indian Territory, 3, 7, 13, 14, 28. Iowa, 2, 3, 6, 11, 12, 14, 15, 19, 20. Kansas, 1, 2, 3, 6, 8, 10, 11, 12, 13, 14, 15, 19, 20, 28. Kentucky, 4, 5, 13, 14, 15, 28, 29. Louisiana, 4, 30. Maine, 3, 6, 21. Maryland, 1, 4, 5, 12, 13, 14, 15, 16, 17, 28, 29, 30. Massachusetts, 5, 16, 21, 23, 30. Michigan, 2, 3, 10, 11, 14, 15, 16, 18, 20, 21. Minnesota, 19, 20. Mississippi, 4, 28. Missouri, 2, 3, 4, 5, 6, 10, 11, 12, 13, 14, 15, 16, 20, 23, 27, 28. Montana, 8. Nebraska, 12, 15, 19, 20, 26. Nevada, 11. New Hampshire, 3, 16, 20, 21, 29. New Jersey, 1, 4, 5, 11, 12, 13, 14, 15, 16, 25, 29, 30. New Mexico, 13, 15, 31. New York, 5, 10, 11, 13, 14, 15, 16, 21, 22. North Carolina, 4, 14, 15, 29. North Dakota, 20, 21, 24. Ohio, 2, 10, 11, 12, 13, 14, 15, 27. Oklahoma, 7, 11, 13, 14, 28. Oregon, 2, 3, 5, 7, 10, 11, 22, 23, 24, 26. Pennsylvania, 1, 5, 11, 12, 13, 14, 15, 16, 21, 25, 29. South Carolina, 4, 15, 29. South Dakota, 14, 15, 19, 20, 21. Tennessee, 14, 15, 28, 29. Texas, 12, 13, 14, 15, 30, 31. Utah, 1, 4, 5, 6, 11, 12, 23, 27, 28. Vermont, 21, 23. Virginia, 4, 5, 12, 13, 14, 15, 16, 17, 25, 29, 30. Washington, 1, 3, 5, 8, 9, 20, 22, 24, 25. West Virginia, 5, 7, 13, 14, 15, 16, 17, 28, 29. Wisconsin, 1, 2, 15, 16, 19, 20, 21. Wyoming, 7, 11, 12, 13, 20.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	5.77	162	+2.2	— 2.1
Middle Atlantic	12	4.86	149	+1.6	+ 0.2
South Atlantic	10	3.67	106	+0.2	—10.2
Florida Peninsula*	8	2.79	112	+0.3	+ 1.6
East Gulf	9	5.28	115	+0.7	— 9.3
West Gulf	7	2.82	85	—0.5	— 5.6
Ohio Valley and Tennessee	11	4.99	143	+1.5	— 6.5
Lower Lake	8	3.10	107	+0.2	— 1.0
Upper Lake	10	2.02	95	—0.1	— 2.9
North Dakota*	8	0.47	82	—0.1	+ 0.7
Upper Mississippi Valley	11	2.72	135	+0.7	+ 2.3
Missouri Valley	11	2.16	204	+1.1	+ 2.2
Northern Slope	7	0.78	138	+0.2	+ 0.3
Middle Slope	6	0.75	79	—0.2	+ 3.7
Southern Slope*	6	1.15	85	—0.2	+ 4.8
Southern Plateau*	13	1.02	84	—0.2	— 1.0
Middle Plateau*	8	1.00	77	—0.3	— 2.3
Northern Plateau*	12	2.09	111	+0.2	— 0.8
North Pacific	7	11.09	126	+2.3	+ 5.8
Middle Pacific	5	3.89	72	—1.5	+ 1.6
South Pacific	4	2.02	67	—1.0	— 0.9

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The precipitation was considerably above the average over the greater portion of the Maritime Provinces, the excess at Sydney amounting to 3.8 inches. In Quebec there was a small deficiency in the western part, while elsewhere in the Province the precipitation was average or a little above. In Ontario, except in a few isolated localities, the average was not maintained, but the minus departures were only locally large. In Manitoba and the Territories the precipitation exceeded the average quantity in some localities and in others it did not attain to it. Winnipeg and Calgary were respectively half an inch below the normal quantity and Medicine Hat and Edmonton half an inch above. In British Columbia, Victoria and Barkerville were 1.4 inches and 1.7 inches, respectively, below the usual amount, while other stations from which returns have been received exceeded the average precipitation. At the close of the month snow to a depth of 20 inches lay on the ground in Cariboo in British Columbia. The Territories and Manitoba were well covered, especially Saskatchewan, where the depth was 12 inches and over. In northern Ontario and over Quebec the depth was from 14 to 24 inches. In the Peninsula of Ontario there was very little, not enough for sleighing in many localities. In the Maritime Provinces the heavy snowfall of the first half of the month had pretty well disappeared and the ground was bare, except in parts of New Brunswick.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Bismarck, N. Dak	23	52	nw.	North Head, Wash	8	70	s.
Block Island, R. I	5	73	ne.	Do	12	60	s.
Do	8	60	nw.	Do	15	55	se.
Do	13	63	ne.	Do	19	60	se.
Do	14	58	n.	Do	22	66	se.
Buffalo, N. Y	3	65	w.	Do	24	71	se.
Do	10	58	w.	Do	25	72	se.
Do	17	55	w.	Do	26	60	s.
Do	22	52	w.	Do	29	62	se.
Do	30	50	w.	Do	30	60	se.
Cheyenne, Wyo	27	52	w.	Do	31	60	se.
Chicago, Ill	2	58	ne.	Philadelphia, Pa	5	52	n.
Do	12	54	ne.	Point Reyes Light, Cal	1	50	nw.
Do	20	51	se.	Do	9	53	s.
Cleveland, Ohio	8	50	w.	Do	13	58	nw.
Duluth, Minn	24	56	nw.	Sioux City, Iowa	24	50	nw.
Do	25	50	nw.	Syracuse, N. Y	16	58	s.
Eastport, Me	26	54	e.	Tatoosh Island, Wash	1	54	w.
Evansville, Ind	2	54	sw.	Do	3	62	s.
Hatteras, N. C	5	60	sw.	Do	10	62	e.
Huron, S. D	27	51	se.	Do	12	54	e.
Memphis, Tenn	2	52	sw.	Do	19	51	s.
Mount Tamalpais, Cal	9	56	sw.	Do	22	57	s.
Do	27	52	nw.	Do	23	64	e.
Nantucket, Mass	5	62	n.	Do	24	64	e.
Do	13	50	ne.	Do	25	76	sw.
New York, N. Y	5	56	n.	Do	28	54	sw.
Do	8	50	nw.	Do	29	62	sw.
Norfolk, Va	5	52	sw.	Do	30	64	sw.
North Head, Wash	1	55	nw.	Winnemucca, Nev	4	52	w.
Do	3	74	se.				

HUMIDITY.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	77	+ 2	Missouri Valley	82	+ 7
Middle Atlantic	77	+ 3	Northern Slope	80	+13
South Atlantic	78	— 1	Middle Slope	75	+10
Florida Peninsula	79	— 3	Southern Slope	72	+ 5
East Gulf	78	0	Southern Plateau	52	+ 4
West Gulf	77	+ 4	Middle Plateau	68	+ 1
Ohio Valley and Tennessee	79	+ 4	Northern Plateau	82	+ 1
Lower Lake	82	+ 4	North Pacific	88	0
Upper Lake	82	+ 1	Middle Pacific	82	— 2
North Dakota	79	0	South Pacific	72	— 2
Upper Mississippi Valley	82	+ 6			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.9	+ 0.1	Missouri Valley	6.4	+ 1.3
Middle Atlantic	6.2	+ 0.8	Northern Slope	5.6	+ 1.0
South Atlantic	5.2	+ 0.5	Middle Slope	5.0	+ 1.0
Florida Peninsula	3.7	— 0.9	Southern Slope	4.6	+ 0.2
East Gulf	5.8	+ 0.6	Southern Plateau	3.5	+ 0.5
West Gulf	5.7	+ 0.4	Middle Plateau	4.8	— 0.3
Ohio Valley and Tennessee	7.5	+ 1.4	Northern Plateau	7.6	+ 0.5
Lower Lake	8.1	+ 0.5	North Pacific	8.4	+ 1.1
Upper Lake	7.7	+ 0.6	Middle Pacific	5.8	+ 0.4
North Dakota	4.8	— 0.4	South Pacific	4.4	0.0
Upper Mississippi Valley	6.8	+ 1.1			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 386 thunderstorms were received during the current month as against 336 in 1901 and 481 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 15th, 61; 12th, 58; 20th, 37.

Reports were most numerous from: Louisiana, 45; Missouri, 39; Arkansas, 31.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 10th to 18th.

In Canada: No thunderstorms were reported. An aurora was observed at Minnedosa on the 23d.

DESCRIPTION OF TABLES AND CHARTS.

By W. B. STOCKMAN, Forecast Official, in charge of Divison of Records and Meteorological Data.

Table I gives, for about 145 Weather Bureau stations making two observations daily and for about 25 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station, the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table IV gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table V gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates per hour (ins.)	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table VI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table VII gives the heights of rivers referred to zeros of gages; it is prepared by the Forecast Division.

NOTES EXPLANATORY OF THE CHARTS.

Chart I, tracks of centers of high areas, and Chart II, tracks of centers of low areas, are constructed in the same way. The roman numerals show number and chronological order of highs (Chart I) and lows (Chart II). The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the observations at 8 a. m. and 8 p. m., seventy-fifth meridian time. Within each circle is also given (Chart I) the highest barometric reading and (Chart II) the lowest barometric reading at or near the center at that time, and in both cases as reduced to sea level and standard gravity.

Chart III.—*Total precipitation.* The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all by 0.0.

Chart IV.—Sea-level pressure and resultant surface winds. The pressures have been reduced to sea level and standard gravity by the method fully described by Prof. Frank H. Bigelow on pages 13–16 of the REVIEW for January, 1902. The pressures have also been further reduced to the mean of the twenty-four hours by the application of a suitable correction, to the mean of the 8 a. m. and 8 p. m. readings, at stations taking two observations daily, and to the 8 a. m. or 8 p. m. observation, respectively, at stations taking but a single observation. The diurnal corrections so applied will be found in Table 27, Volume II, Annual Report of the Chief of Weather Bureau, 1900–1901, pp. 140–164.

The isotherms on the sea-level plane have been constructed by means of the data summarized in chapter 8 of Professor Bigelow's Report on the Barometry of the United States and Canada, which can be found in the Annual Report of the Chief